

Abstracts of the Milroy Lectures
ON
AN INQUIRY AS TO THE PHYSICAL AND MENTAL
CONDITION OF SCHOOL CHILDREN.

Delivered before the Royal College of Physicians of London,

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ABSTRACTS OF THE MILROY LECTURES
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LECTURE I.—THE PRINCIPLES EMPLOYED AND THE BASIS OF
THE METHODS OF INQUIRY.

REFERRING to the commencement of his studies of the mental status of children, the lecturer gave his experience of the unsatisfactory character of the signs in physiognomy, craniology, etc., when unsupported by signs of the more direct physiological action of the nerve system. As all expression of nerve states and of mental action is by movements and results of movement, it is by logical analysis of the nerve signs corresponding to such visible expression that we may hope to demonstrate the kinds of nerve action which correspond to mental states. While studying visible movement, it became obvious that certain typical postures often correspond with definite and definable physiological and pathological conditions, and might, therefore, be used in recording such states. This led to the enumeration of many new clinical signs. The signs of nerve action as seen in an infant were then described.

In a healthy newborn infant we find movement in all its parts while it is awake—that is, while its brain is in full functional activity. These movements may be seen in the limbs, especially in the digits, which may move separately; they are slower than most of the movements in adults, they are almost constant, and are but little under control of impressions through the senses. Such spontaneous movement Dr. Warner described under the term “Microkinesis” in 1888.¹ When the infant is about three months old we may observe some control of its movements through the senses; the microkinesis remains as the marked character, but the combinations of nerve centres acting are to some extent co-ordinated by sight and sound. At the age of four or five months further evidence of control of the centres through the senses is seen; the sight of an object may temporarily inhibit the movements, and this may be

¹ *Proceedings of Royal Society*, vol. xlv. *Journal of Mental Science*, April.

followed by turning of the head, eyes, and hands towards the object seen—that is, the co-ordinated movement occurs sequent to a period of inhibition of spontaneous action following stimulation. We infer from such observations that at birth the nerve centres act slowly and independently of one another, and the time and order of this action is not determined through the senses; at the age of five months their action may be temporarily suspended by external stimuli, and during the time when no efferent currents are passing from them to produce visible movements they undergo a change, subsequently indicated by new and special co-ordinated movements. This appears to be a new and great advance in the infant's cerebral evolution. When a year old, action well adapted by impressions received becomes very marked, and the child makes certain characteristic sounds on sight of certain objects; its spontaneous brain action becomes gradually more and more capable of co-ordination.

It appears that whereas at birth the most marked character of the nerve centres is the spontaneous action of individual loci of nerve tissue, in advancing evolution this spontaneity is not lost, but remains as the foundation of so-called voluntary and intellectual action becoming more controllable by circumstances. Aptitude for mental action appears to depend upon the capacity of nerve cells for control through the senses, such impressions temporarily inhibiting their spontaneity and arranging them functionally for co-ordinated action. The imbecile infant does not show this microkinesis in the normal degree; its nerve centres are wanting in spontaneity, and later in capacity for co-ordination. It may be shown that well co-ordinated visible movements usually accompany well-controlled mental action, while a spreading area of movement not controlled often accompanies mental confusion.

This spontaneous movement, slightly under control, is the character of healthy brain action of children in the infant school, so that postures are less available as signs among these very young children, and spontaneous movement of their fingers is normal. The parts of the infant are then full of spontaneous movement; an exception is in the eye movements, which are not frequent in many cases. One of the endeavours of infant training should be to encourage eye movements, then to control them. The postures or attitudes of the body imply balances or ratios of action in the nerve centres corresponding; the clenched fist or convulsive hand is common in fits and in tetany. These postures indicate relations in quantity of action among nerve centres. If we take the 2,285 cases presenting deviations from the normal balance of the hand when held out, we find that 1,029 of them presented visible defects in development also, that is to say, in nearly half of these cases with unusual or defective ratios of nerve action, the proportioning of parts of the body was visibly abnormal. This suggests the hypothesis that the forces, or antecedent conditions, which caused ill-proportioning of the body may also have caused a tendency to ill-balancing of nerve centres. The converse of the proposition may be true—we have not as yet sufficient evidence, but the suggestion may guide inquiry—it may be found that as over-action of the frontal muscles is very common with defects of the cranium, and over-action of the frontals is largely the outcome of want of mental stimuli, further culture of the mental faculties will improve the average cranial develop-

ment, and lessen over-action of the frontals at the same time. If we take the 5,487 cases with abnormal nerve signs, we find among them 3,071, or 55 per cent., who also present defects in development; conversely, among the 5,851 cases of defects in development, we find 3,071 cases with abnormal nerve signs, that is, 52.4 per cent. If we take cases with two defects in development, such as are given in Lecture IV, we see that they are correlated with nerve signs in percentage, varying from 44.5 up to 71.8.

The general statement that malproportioning in visible parts of the body and abnormal nerve signs are often coincident may be further illustrated, and such inquiry may lend some support to the hypothesis that both kinds of defects may be due to the action of physical forces controlling quantities or ratios of vital action. In rickets there is a marked tendency to malproportioning in the skeleton; this is seen in epiphysial overgrowth, in unequal bilateral growth of the shafts of bones producing curvature, and in the skull producing bosses and deformities. This tendency to mal-development may affect the features and soft parts; among 196 rachitic children, 15 were small in growth, and 40 presented defects of ear, epicanthis, features, palpebral fissures, mouth, etc. This also is a condition that falls much more commonly upon the boy than the girl; about one-third of these mal-proportionate rachitic children presented abnormal nerve signs and mental dullness. In observing conditions of development and physiognomy as indications of probable conditions of mental status—as in older physiognomical studies—the assumption is made that visible conditions of defect in form more or less necessarily coincide with defective brains. Such correspondence does, doubtless, often occur, but the generalisation is too empirical to be applied with safety to the individual child. Here the observation of a number of abnormal nerve signs helps to supply the missing link, and observations quoted show that among children with defects in development and abnormal nerve signs, one-third are reported by the teachers as dull at school lessons.

In the report prepared on 50,000 children, and in quotations from it, the term "defect in development" is frequently used; this signifies deviation from the average or normal. It is not intended to assert that these signs are degenerations—the evidence derived from antique works of art shows that many are of ancient date—it appears that in some classes they may be irregularities which further evolution, if wisely guided, may remove with their attendant evils. Among the 2,961 Jew children, an ancient race, uniformity of development was very marked, with 7.5 per cent. of deviations from the normal, and all points in nutrition, nerve action, and mental status appeared more regular among them than with our English children. When it is pointed out that of English children 10.8 per cent., and of the Jew children 7.5 per cent., present deviations from the average development, it is obvious the proposition may be put thus: the English children to a percentage of 89.2, and the Jew children to a percentage of 92.5, have evolved an average type.

It is very common to see disordered conditions of the nerve system in children with defective construction of body—this was the case in 3,071 children—we may also see these nerve disturbances in children of normal construction of body—this was noted in the report in 2,416 children; here such

signs would appear to result from the disorder produced by special circumstances rather than from defects in original construction. In illustration, children fatigued and in the condition of chorea may be described. Among the signs of fatigue are the slight amount of force expended in movement, often with asymmetry of balance in the body; the fatigued centres may be unequally exhausted, spontaneous finger twitches like those of younger children may be seen, and slight movements may be excited by noises. The head is often held on one side; the arms when extended are not held horizontal, usually the left is lower, the hand balances in the weak type of posture, often again more markedly on the left side. Facial expression is lessened, and the orbicular muscles of the eyelids are relaxed, leading to fulness under the eyes, while the eyes themselves fix badly.

Nutrition is a somewhat vague term; as applied to children in this inquiry it implies that the child as seen was thin, pale or delicate-looking. It is not sufficient evidence as to good nutrition to look at the face only; this part may be well nourished, and yet the limbs may be thin; I usually felt the child's arms or legs. The most important fact noted with regard to these cases, which amounted to 2,003, is that 1,459, or 73 per cent. were cases presenting visible signs of deviation from the normal in development of the head, the features, and other parts. It seems then that there is a large group of children, amounting to nearly 3 per cent. of the children seen who are so far defective in make as to be usually of low nutrition when seen in school. This fact is more marked in the 36,000 children in day schools; among them 23 per cent. of the boys, and 38 per cent. of the girls who presented defects in development were noted as of low nutrition. It appears that these children are of lower general constitutional power, and tend to an ill-nourished condition under the stress of life, and the many causes of mental excitement which, while they render them sharper mentally, militate against nutrition of the body and its tissues. That the amount of mental stimulus received by children does lower their general nutrition, seems to be further indicated as follows. If we divide the 36,000 day scholars into two groups, 10,200 seen in day schools of upper social class, presumably well fed children, we find 5.2 per cent. of low nutrition; and among the 25,800 children in poorer day schools, 3.9 per cent.; the only explanation to be offered is that the upper class children have more stress upon them than those of poorer social position. This subject will be pursued later on.

Methods of Observation and Research.—The methods of examining the physical condition of children seen in schools must necessarily be more limited than those used in the consulting room. Arrangements already exist in the reports of Her Majesty's inspectors for determining the intellectual acquirements of school children; their family history and evidence as to their home life could not be obtained, and school managers naturally object to questions being asked of the children concerning their health, which if put, would not be likely to elicit any trustworthy information; it is also impracticable to handle the children for the purposes of physical examination. The observer must then depend mainly upon inspection, and having determined beforehand what points to look for, he must record accurately what he

sees. The importance of deciding on a number of physical signs for observation and record was appreciated before the work was commenced on a large scale. For the purpose of observing those finer balances and reactions of the nerve system which indicate neuro-mental potentialities, it is better to deal with the children in a uniform manner, and not to handle them.

The terms used in giving descriptions of children should each connote a fact seen and capable of verification and comparison, the essence of scientific description.

LECTURE II.—THE SIGNS OBSERVED IN DESCRIBING CHILDREN.

CRANIAL abnormalities appear to be the most important defects in development; they are the most numerous and have the highest pathological correlation of any sign with "abnormal nerve signs," low nutrition, and mental dulness: Boys, 1,528; girls, 1,048; total, 2,576.

The size and probable volume of the brain is a point of first-class importance, and the size of the cranium is in children a fair indication of the size of the brain. The following standard of the normal in a well-developed child of good potentiality may be given: Head circumference at 9 months, 17.5 inches; at 12 months, 19 inches; at 7 years, 20 to 21 inches. This I believe to be a high-class standard of the normal, too high if deviations therefrom are to be considered as pathological; after 3 years of age 19 inches cranial circumference is too small. The figures given indicate the number of cases in which the condition stated was noted among the 50,000 children seen in this inquiry—boys, 26,884; girls, 23,143. Defects of the cranium may be divided into subclasses:—

Small heads: boys, 327; girls, 738; total, 1,065. It is seen that in this group, contrary to the usual rule, the defect is more common among girls. If there be no other defect, mental faculty may be average, but the child usually remains thin and delicate; such cases in after life may undertake good work and do it, but are more liable than others to exhaustion, migraine, and breakdown of the nerve system. At school these children are often delicate and irregular in attendance from ailments.

Large heads: boys, 257; girls, 46; total, 303. It seems probable that a large proportion of these cases resulted from rickets at an earlier period, for of the 168 cases of rickets with defect of cranium, 55.3 per cent. were large heads.

Cranial bosses: boys, 495; girls, 127; total, 622. Cranial bosses are most usual at the site of the ossific centres of the two halves of the frontal bone; they may occur at the sides of the head over the parietal centres and elsewhere, as well as at the site of the anterior fontanelle.

Asymmetrical heads: boys, 84; girls, 16. These did not appear to have marked correlations with defects. Various other defects of head and forehead were then described.

The palate was ill shapen in 1,331 children, standing next to the cranium, both in frequency and in a high correlation to defectiveness. The palate was examined in all children. The frequency of the various types has been given, but their

relative correlation was not determined; there were 22 cases of cleft palate in the 50,000 children.

The ears were malproportioned in: boys, 1,047; girls, 268. The various forms of defect were described. Among pathological curiosities, supernumerary ears, remnants of branchial clefts, congenital absence of ear, etc., were described; the adherent lobe did not appear as a marked defect.

The epicanthis was noted in 898 children. It appeared to have a lower correlation with defectiveness than other signs; when associated with defects of the cranium, however (90 cases), the defectiveness of the group of cases was very marked. Defective growth in the bridge of the nose (455 cases) did not appear to be associated with rickets; the condition appears to be outgrown in many children, and its pathological correlation is not high. Among conditions of the facial tissues, notes were taken of cases of: features large and coarse, 251; palpebral fissures small, 181; mouth small, 44; bridge of nose in its soft tissue redundant, 61. It is important to note each feature separately, as the defects seem to have different correlative values. The epicanthis was found to a considerable extent local or endemic in certain districts. These defects are often associated. A hairy forehead, large frontal veins, and a small face under a well-made calvarium was found in some cases. Prognathous type was noted in 11 boys; ichthyosis in 17 cases; congenital cyanosis in 3 boys; there were various other minor defects.

Passing on to the description of "abnormal nerve signs," Dr. Warner proceeded to enumerate them the number found among the 50,000 children, and to give their pathological correlations.

Expression defective: boys, 694; girls, 474. This sign has the highest pathological correlation of any nerve sign. The term is here used to connote the general expression of the face as above and apart from the special muscular balances and action described further on; a good expression may be present with abnormal coarse muscular action.

Frontal muscles overacting: boys, 1,322; girls, 1,616. Horizontal creases are thus formed; these muscles may often be seen working in athetoid fashion under the skin. The sign may appear in children at any age, and is usually most marked when they are least occupied.

Corrugation: boys, 199; girls, 40. This knitting of the eyebrows may be a "coarse" or a "fine" movement; like the last sign, it may be athetoid in character, and the two signs often coexist.

Orbicularis oculi relaxed: boys, 522; girls, 343. The skin of the lower eyelid is relaxed, puffy, and bags forward. The sign often accompanies fatigue and recurrent headaches.

Eye movements defective: boys, 798; girls, 485. The eyes may wander and fix badly, or they may be too immobile, so that the child follows a moving object by turning the head, not by moving the eyes. Nearly half of these children were dull at lessons.

Two modes of hand balance were described. The weak type—boys, 715; girls, 504—where the wrist and digits fall into moderate flexion; the "nervous" type—boys, 550; girls, 516—presents flexion of the wrist with over-extension of the digits. The former type is common in weak children, the latter in those who are irritable, nervous, over-mobile. The percentage correlations are: for the "weak hand" defects in

development, 47; low nutrition, 18; mental dulness, 38; for the "nervous hand" defects in development, 43; low nutrition, 25; mental dulness, 33.

Finger twitches: boys, 445; girls, 261. This condition, though more common in boys, passes on to chorea more frequently in girls.

Lordosis: boys, 184; girls, 279. The lumbar spine is markedly arched forward when the hands are held out in these cases.

Head balance asymmetrical: boys, 219; girls, 319. The percentage correlation of this sign is high: defect in development, 61; low nutrition, 29; dull, 45.

Among the less frequent abnormal nerve signs were described: "General defective balance," "Defective response in action," "Speech defective," "Mouth open," "Grinning," "Nystagmus," "Ptosis," "Tremor;" these minor groups included 668 children.

LECTURE III.—RESULTS OF INSPECTION OF 50,000 CHILDREN SEEN AT 106 SCHOOLS: THE CLASSES AND GROUPS OF CHILDREN DESCRIBED.

THE study of the principles and methods of procedure to be employed and practice in making observations and in describing them was so far advanced in 1888 that a Committee was formed by the Psychological Section of the British Medical Association, and, in conjunction with Dr. Hack Tuke, Dr. Fletcher Beach, and Dr. Shuttleworth, Dr. Warner made observations on 5,000 children in 14 schools and published a report,² with the aid of a grant from the funds of the British Medical Association. It should here be said that the observations of 1888-89 are incorporated in the larger report of 1890-92. This first inquiry and the subsequent arrangement of cases in groups afforded valuable experience, and gave many useful hints as to how the work should be further extended; and also as to the best methods of keeping the records and the kind of results to be looked for.

Following the publication of this first report a Special Committee was appointed by the Charity Organisation Society, including representatives of the older Committee, and a report has been prepared on 50,000 children seen—boys, 26,884; girls, 23,143.

GROUP I. *Normal or Average Children.*—Boys, 21,315; girls, 19,536. Percentages on numbers seen: Boys, 79.3; girls, 84.5. Such children are the average as presenting no visible defects or abnormal nerve signs and not being dull at lessons.

GROUP II. *Children Presenting Some Deviations from the Normal, of whom Notes were accordingly taken.*—Boys, 5,579; girls, 3,607; total, 9,186. Percentage on numbers seen: Boys, 20.7; girls, 15.5; total, 18.3. Schedules were filled in for each of these cases. Their varying conditions have been analysed, and they will now be presented in groups or classes.

GROUP III. *Children Presenting No Defects in Development or Abnormal Nerve Signs, but Reported as Dull by the Teachers.*—

² See BRITISH MEDICAL JOURNAL, 1889, ii, p. 187.

Boys, 185; girls, 134; total, 319. Such cases present good physical development, and a sound condition of brain as indicated by motor action. It appears that the brains of these children, though capable and healthy, had but little power for school work. It is important to differentiate such pupils from those with defective conditions.

GROUP IV. *Children Feeble-minded or Exceptional in Mental Status*.—Boys, 124; girls, 110. Of these cases, 2 were idiots; 46 imbeciles, or definitely mentally wanting; 12 were mentally exceptional, wanting in moral faculty, or liable to mental attacks; 174 are entered as "feeble-minded" or defective in mental capacity, short of actual imbecility. Probably many of them would, on further examination, be found imbecile; some may be capable of great improvement.

GROUP V. *Epileptics and Children with History of Fits During School Life*.—Boys, 36; girls, 18; total 54. These cases were inquired for in every school, and in some instances children not attending school were sent for by the teachers. Any case with a history or indications of fits during school life was recorded for what it may be worth. A list of these cases has been published.³ It would appear that most epileptic children are absent from school. Of the cases given, 5 boys and 5 girls were mentally defective.

GROUP VI. *Children Crippled, Paralysed, Maimed, or Deformed (not Eye Cases)*.—Boys, 155; girls, 84; total 239. These children varied greatly in brain power—some were mentally bright, others dull; they also varied in conditions of health. The conditions of disease causing crippling were in various stages, and many of these children were capable of work and play. Five boys and 5 girls were mentally defective.

	Boys.	Girls.	Total.
Cripples from congenital defect ...	7	9	16
„ disease or injury ...	88	53	141
„ paralysis ...	60	22	82

GROUP VII. *Children Deaf, or Partially Deaf*.—Boys, 34; girls, 33. These numbers do not include 51 children seen in a special school, of whom an account was given. Tests for hearing were not commonly used, but a child found deaf was noted; there were some deaf and dumb in the day schools.

GROUP VIII. *Eye Cases*.—Boys, 836; girls, 637. Tests for vision and errors of refraction were not used, and ophthalmia was passed over; but when the eyes were looked at obvious defects were noted. Ophthalmia was seen in some day schools. There were of squint cases 807, some requiring operation; many temporary, but only 276 children in all, used convex glasses; 48 used concave glasses. The group shows what a large amount of ophthalmic work is needed among children.

GROUP IX. *Children Pale, Thin, Delicate, Nutrition Low*.—Boys, 1,030; girls, 973. The most obvious fact concerning these children was that 733 of the boys and 726 of the girls presented some defects in development. No inquiries were made as to the feeding of these children, but it may be assumed that among the upper grade schools and in the resident schools food was sufficient; still, the development cases were of low nutrition there also. Among the 50,000 cases the percentage of low

³ Interim Report on Feeble-minded Children, C. O. S.

nutrition was for boys 3.8, for girls 4.2; and among the development cases it was for boys 20.2, for girls, 32.0.

GROUP X. *Children Presenting Defects in Development.*—Boys, 3,616; girls, 2,235. Conditions of mal-development form the largest class of visible defects observed, and as signs easily recognised and capable of description and classification, they stand prominently forward as pathological conditions characterising portions of the child population. Analysis and comparison of cases shows the developmental signs to be of different value and importance; to demonstrate this the correlations of each sign has been determined (see Interim Report published). From the point of view of estimating potential mental capacity, these signs are of value only in as far as experience gained in observation shows their average correlation with cerebral or mental defects. The defectiveness in the make of a child is more strongly indicated when two mal-developments are present. This was noted in 1,240 boys, 683 girls. Their correlation was higher than for a single defects—with nerve signs, 45; low nutrition, 31; dulness 60 per cent.

GROUP XI. *Cases presenting Nerve Signs.*—Boys, 3,413; girls, 2,074. Abnormal nerve signs are largely correlated with defects in development, that is to say, some malproportion in the parts of the body is largely associated with a tendency to ill-balance among the nerve centres. The significance of these signs varies in two directions; some indicate an over-mobile nerve system, the centres tending to separate and spontaneous action, not well under control through the senses, of which finger twitching is the type; and a second set which indicate low-class brain development, these are mostly repetitive uniform movements, athetoid in type, and represented by chronic overaction of the frontal muscles and repeated grinning.

GROUP XII. *Cases of Rickets.*—Boys, 157; girls, 39; total, 196.

				Boys.	Girls.	Total.
With nerve signs	...	...	...	54	15	69
With low nutrition	...	...	...	32	13	45
With mental dulness	...	...	...	64	10	74

Probably more children were or had been rachitic than those registered; when the conditions seen in the bones left no doubt the case was registered accordingly, but the body could not be examined in detail under the conditions of this inquiry. To my mind it seems that a great character about the conditions termed rickets is the malproportions of growth in the skeleton, especially about the cranium. It is shown that the palate is frequently ill formed, and also that defects in development other than cranium and palate were found in boys, 58; girls, 11; total, 69 cases. The pathological question might be raised whether a large proportion of the cases registered as "cranial bones"—a subgroup of the cranial abnormalities amounting to boys, 495; girls, 127; total, 622—were not really cases of rickets. These rachitic children are badly proportioned:

				Boys.	Girls.	Total
Cranial abnormalities...	...	...	...	143	26	168
Palate defective ...	...	...	...	23	8	31
Cranium and palate defective	...	...	...	21	6	27
Small in growth ...	...	...	...	10	5	15

GROUP XIII. *A Group of Cases with Defects in Development, Abnormal Nerve Signs, and Low Nutrition.*—Boys, 412; girls, 381; total, 793.

	Boys.	Girls.	Total.
With mental dulness	192	157	349

This group appears in fact to present a special class of development, cases in which the inheritance has produced not only visible malformations or proportioning in the body, but also a constitutional tendency to low nutrition, and a state of nerve centres ill balanced or badly acting. Such children may be said to be delicate, and 44 per cent. of them were reported by teachers as dull. These children, when dull, are included in the group who appear to need special care or training.

GROUP XIV. *Children reported by the Teachers as Dull in School.*—In every case recorded the teacher's opinion concerning the child's mental capacity was asked for and taken down as evidence. The number of dull children was: boys, 2,216; girls, 1,463; total, 3,679; their correlations are given in full in a table. Of these dull children, defects in development or abnormal nerve signs were found in 3,266 cases.

GROUP XV. *Children that appear to require special Care and Training.*—It is not intended to imply that these children cannot be provided for in day schools, but they need to be provided for, and it might be well that they should be marked on the school register, and their attendance and progress noted by the managers. The group includes "children feeble-minded or mentally exceptional, Group IV; epileptic, cripples, and the development cases with low nutrition and nerve signs, who were reported as dull mentally." The group as thus arranged, allowing for overlapping cases, contains 817 children (boys, 473; girls, 344), or 1.6 per cent. of the 50,000. Of the number given, 165 are included on physical grounds, not being mentally dull.

GROUP XVI.—*Children presenting Abnormal Nerve Signs without Defects in Development.*—Boys, 1,438; girls, 978; total, 2,416. In these cases there are no indications of defect in development to account for the nerve signs, and they appear to be due to other causes; they are slightly more frequent among the resident children and among the upper class children than in the average day schools, so that low feeding does not appear as a potent cause. It is probable that in this group we have the children of normal make who are ill-trained, neglected, and overpressed by the stress of life. These seem to be the children most improvable by altered conditions and appropriate training; many are of ill balance and nervous; 39 per cent. of these were dull.

GROUP XVII. *Children presenting Development Defects with Abnormal Nerve Signs.*—Boys, 1,975; girls, 1,096; total, 3,071.

	Boys.	Girls.	Total.
With low nutrition	733	726	1,459
With mental dulness	835	475	1,310

These children appear as cases with malproportioning of the body and ill-balanced nerve centres. The percentage of dulness among them is higher than among either the "development cases" or the "nerve cases."

GROUP XVIII. *Children presenting Development Defects without Abnormal Nerve Signs.*—Boys, 1,641; girls, 1,139; total, 2,780. These development cases, with a well regulated nerve system, present less dulness than the last group, showing the importance of observing nerve signs. Of development cases with nerve signs, 43 per cent. dull; of development cases without nerve signs, 35 per cent. dull.

Comparing groups of schools the percentages go against the residents as compared with day schools, except as to nutrition. Again, comparing schools of upper and lower grade, the conditions found are in favour of the lower class. Lastly, among the English children development defects are found in 10.8 per cent., among Jews in 7.5 per cent., among the Irish in 20 per cent. The lecture was illustrated by tables and charts which it is impossible to give here.

LECTURE IV.—THE BEARING OF THIS INQUIRY ON STATE MEDICINE, EDUCATION, AND THE CARE OF CHILDREN.

THE State becomes heavily burdened by the defectively-made portion of the population, which probably tends to accumulate under extensive emigration, which leaves with us the weak tending to pauperism, starvation, vagrancy, and crime; a large body of "unemployed" and others capable of earning only small and varying wages; the field for recruiting the services is also limited. Were this lower stratum improved, it would pave the way for social improvement, higher education, better, and more valued wage-earning, and less social failure. It must be remembered that these feebly-gifted children are confined to no social class, and appear more numerous in the upper grades; the Nation collectively is but the aggregate of its components. These observations show the harm that probably arises from exempting the feebly-gifted and defective children from all education because they are unfitted to compete, even in school, with the average and the normal.

It is then as important concerning a certain locality or sanitary area to know the average condition of the children as the rate of mortality. Maldevelopment has been shown, as far as the facts go, to be a potent factor in predisposing to both mental dulness and low nutrition, two evils worth combating; it is not solely for the purpose of attaining a condition of the people with a smaller percentage of badly made heads, palates, ears, noses, or other bodily defects, that a strong effort is called for, but that in removing the causes of such defects we may lessen the average of mental feebleness and low nutrition co-attendant.

The ends which it is desired to attain through State medicine are to improve the average development, nutrition, and potentiality for mental faculty, and thus to lessen crime, pauperism, and social failure, by removing causes leading to degeneration among the population.

Correlation, or the Relations of Physical and Nerve Signs to Low Nutrition and Mental Dulness.—In a table given, the number of cases presenting each sign has been shown, and in the more important instances where the number of cases in

which the sign was observed was large enough, or where the intrinsic value or interest of the sign seemed to call for it, the correlation has been added showing the number of cases presenting the sign who were also registered as presenting "low nutrition," abnormal nerve signs, mal-developments, or mental dulness respectively. These correlations have been put into the form of percentages in a table.

It is not wished to represent the percentages as having an absolute value of correlation to the sign which may be applied to an individual child. The correlation for some signs is probably of small value on account of the small number of cases observed, but it is given as illustrating that each physical or nerve sign has a correlation average with mental dulness, nutrition, etc. When the correlation is on a small number of cases the need of further observations in this direction is indicated. The percentage form is useful as indicating that some generalisation, drawn from large groups of cases apply equally to the individual signs characterising the group. Thus defects in development have a higher correlation with abnormal nerve signs in boys than in girls, but as to nutrition and mental dulness the girls suffer most.

As a contribution towards the etiology of defective development, Dr. Warner has arranged the 3,704 development cases seen among 34,991 children according to their distribution in twenty districts; is this shown in Table VI of the Report. The percentage of these development cases taken upon the number of children seen in each district respectively is given in Table VII. It is shown that the distribution is very unequal, being high in the western district of Kensington and Chelsea at 12.6 per cent., and lower in the poorer schools of Islington at 7.4 per cent. This table also gives the percentage distribution of the principal defects registered taken in two ways: (1) Upon the number of children seen; (2) upon the number of development cases. If such observations are confirmed by further experience, this method of arranging the facts may afford evidence upon the causes in the district tending to produce defects in development and possibly for determining the particular kind of defect most prevalent. Observations of the 1,363 development cases in Poor-law schools, which are drawn from certain areas, are similarly given in Table VIII, and a table has been prepared for comparison, showing conditions of the children in day schools for areas corresponding to the unions. In certain districts the ratio of boys and girls presenting same conditions is not the average.

As a preliminary to trying to determine the means that may be used to try and lessen the physical causes of mental dulness, Dr. Warner has given a table of the conditions and group of conditions accompanying it, and has determined, as far as the present work goes, the correlative value of each sign in development and nerve action observed, as well as the distribution of these signs in certain areas or districts, and in certain classes of schools and in the Nationalities. The percentage of mental dulness rises from 38 for development cases without nerve signs to 43 when both are present, reaching 44 when the maldevelopment is accompanied by low nutrition and abnormal nerve signs.

Development Cases Considered in Relation to Sex and Residence.
—If we take 100 boys and 100 girls with defects in development from among the 50,000 children seen, we shall find many

of them with abnormal nerve signs, low nutrition, and mental dulness. Following the experience gained, the following estimate may be given showing the probable results of placing them first in a day school and then in a resident school.

In the Day School.

<i>Boys' Side.</i>				<i>Girls' Side.</i>			
100 boys with defects in development.				100 girls with defects in development.			
Nerve cases ...	...	...	50	Nerve cases ...	...	...	47
Nutrition low ...	...	...	23	Nutrition low ...	...	...	38
Reported dull ...	...	...	38	Reported dull ...	...	...	40
<hr/>				<hr/>			
Cases of nutrition low, nerve signs, or dull ...			111	Cases of nutrition low, nerve signs, or dull ...			125

In the Resident School.

<i>Boys' Side.</i>				<i>Girls' Side.</i>			
100 boys with defects in development.				100 girls with defects in development.			
Nerve cases ...	...	...	62	Nerve cases ...	...	...	52
Nutrition low ...	...	...	16	Nutrition low ...	...	...	20
Reported dull ...	...	...	40	Reported dull ...	...	...	44
<hr/>				<hr/>			
Cases of nutrition low, nerve signs, or dull ...			118	Cases of nutrition low, nerve signs, or dull ...			116

It is thus obvious that residence contrasted with home life and day school produces marked effects, different among boys and girls. On both sides of the resident school nutrition becomes higher, more markedly with the girls. Nerve signs increase with residence, especially with boys. Mental dulness increases with residence slightly, more so among the girls.

The loss and gain from putting 100 boys and 100 girls with defects in development in resident schools may be represented thus :

	Boys.		Girls.	
Fewer cases of low nutrition	7	...	18
More cases of abnormal nerve signs	12	...	5
More cases of mental dulness	2	...	4

Assessment of Results of Intellectual and Physical Training in a School, with Allowance for the Physical Condition of the Children.—Having obtained a report on the physical condition of the children in a school, we may proceed to estimate the number of dull children and the number with nerve signs to be expected upon allowance for the material in the school. The estimate is founded upon the conditions seen and the average experience of 50,000 children, the allowance being made upon the development cases and nerve cases; an allowance for low nutrition could be added.

There are two results of physical training which characterise it as satisfactory : (1) in cases of defective development to remove or prevent abnormal nerve signs; (2) in children of normal development to prevent, or at least not to produce, nerve signs. Thus, taking the development cases in a school, a high percentage of abnormal nerve signs among them is against the effects of the training; and a high percentage of nerve cases without defects in development suggests that the training is not good. So also, in each case a high percentage of mental dulness shows want of adaptation of methods of teaching to the special requirements of the children.

A form is given (see Report) upon which the principal facts observed in a school may be recorded; from these estimates may be made. We may estimate as dull children:—

		Boys. per cent.		Girls. per cent.
Of development cases with nerve signs	...	43	...	43
Of development cases without nerve signs...	...	33	...	39
Of nerve cases without development defects	...	37	...	41

We may estimate as the average number of cases with nerve signs:—

		Boys. per cent.		Girls. per cent.
Of the development cases...	...	55	...	49
Of the total number of children seen as presenting nerve signs without defects in development		5	...	4

The work that has already been done, and the report from which extracts are given, afford a considerable amount of evidence to the following propositions:—

A. It is practicable to inspect, report upon, and classify the children seen in a school by means of facts seen and the teacher's report. Evidence of scientific value is thus obtainable of importance to the State, to education, and to philanthropic efforts.

B. The average child material in a school or district may be determined. The conditions of development and the nerve signs vary much in different schools; as to the latter, observation suggests that adapted methods of training may remove them.

C. The correlation of visible signs with low nutrition and mental dulness has in many cases been demonstrated.

D. Ill-made and feeble children tend to gravitate to the Poor-law and certified industrial schools, and to the lower standards of day schools. The want of provision for feeble children in day schools, and in many cases their exemption on medical certificates, tends to throw such cases upon the care of the State, and many become degraded.

E. Feebly-gifted children, the paralysed, and in some cases the epileptic, may in many cases and in limited numbers be educated in day schools if better provision for them is not provided.

